RV Littorina 02/12

Cruise Report

Sagasbank (Mecklenburg Bay, Baltic Sea)

27th February – 2nd March 2012

Institute of Geosciences (IfG),
Sedimentology, Coastal and Continental Shelf Research
Christian-Albrechts-University (CAU), Kiel

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Kiel, April 2012

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1. Introduction

This cruise with the RV LITTORINA was the first of three planed legs to be carried out in the area of the Sagasbank (Mecklenburg Bay).
Sagas-Bank is an elevation east of the Wagrian peninsula with several elevations of up to 8 meters below sea level (Figure 1). The center of Sagasbank is marked by the 10 m contour line. Sagasbank and the adjacent submarine areas (in total 3.238 km²) are declared as FFH-site (flora-fauna-habitat).
Residual sediments (boulders, blocks, sand and gravel) of the last glacial period are ideal habitat for submarine flora and benthic organisms. Here, 115 macro-zoobenthic species (with at least 20 red list species) and 17 algae species (with 6 red list species) are living on Sagasbank. The shallow water area is also habitat for porpoises and one of the most important bird resting places in the Baltic Sea. The habitat is exposed to fishing industry, military and sporting and leisure activities.
This cruise is part of cooperation between the Institute of Geosciences at the University of Kiel and the local authority 'Landesamt für Landwirtschaft, Umwelt und ländliche Räume' (LLUR). The aim of this cruise (and the following two) is a full coverage, hydroacoustic mapping of Sagasbank and the surrounding area. The hydroacoustic data are calibrated by grab sampling and under water videos. Of special interest are the regions covered with hard substrate providing habitat for macro-zoobenthos and fishes.

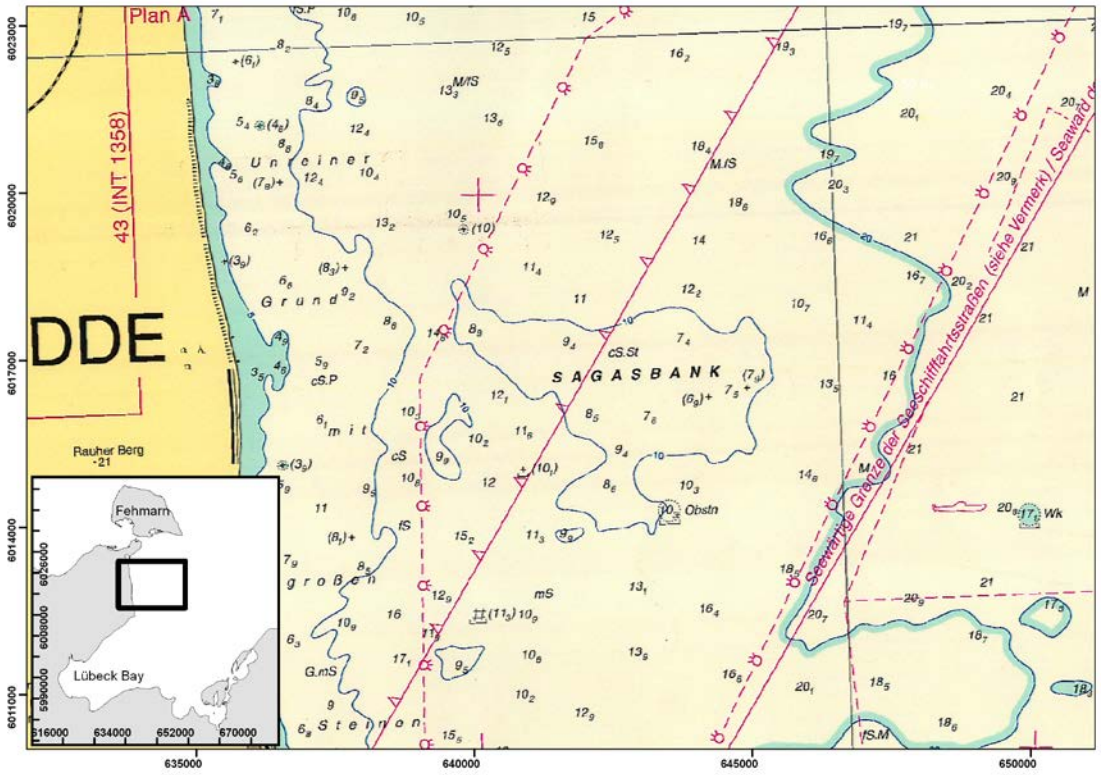

Figure 1: Overview of the area around the Sagasbank between Fehmarn Island and Lübeck Bay.

2. List of Participants

Svenja Papenmeier	chief scientist	IfG	27.02.-02.03.12
Christoph Heinrich	scientist	IfG	27.02.-28.02.12
Mareike Kampmeier	student	IfG	29.02.-02.03.12

3. Cruise Narrative

(all times are in UTC)

27th February 2012:

Departure:	Kiel, 07:00
Activities:	- 07:00 – 12:30 Transit to study area - 12:30 Installation and check of scientific equipment. - 12:58 CTD-profile - 12:10 – 12:29 Multibeam calibration - 13:08 – 15:44 MBES, SSS, SPB (2 profiles)
Arrival:	Burg, Fehmarn 17:00
Weather Conditions:	Cloudy, rainy, W/SW 3-4 Bft, wave 0.3 m

28th February 2012:

Departure:	Burg, Fehmarn 06:30
Activities:	- 07:23 CTD-profile - 08:14 – 16:00 MBES, SSS, SPB (6 profiles) - Christoph Heinricht left and Mareike Kampmeier arrived in the evening.
Arrival:	Neustadt in Holstein, 18:45
Weather Conditions:	Cloudy, W 4-5 Bft, wave 0.3-0.5 m

29th February 2012:

Departure:	Neustadt in Holstein, 06:20
Activities:	- 08:34 CTD-profile - 08:54 – 15:34 MBES, SSS, SPB (5 profiles)
Arrival:	Burg, Fehmarn, 16:40
Weather Conditions:	Cloudy, foggy, W 3-4 Bft wave 0.0-0.1 m

1st March 2012:

Departure:	Burg Fehmarn, 6:15
Activities:	- 07:09 CTD-profile - 07:46 – 11:42 MBES, SSS, SPB (3 profiles) - 12:00 – 14:24 Grab sampling (16 samples) - 14:45 – 14:56 Under video profiling (1 profile)
Arrival:	Burg, Fehmarn, 17:00
Weather Conditions:	Cloudy, foggy, in the afternoon sunny, W 4 Bft, wave 0.0-0.1 m

2nd March 2012:

Departure:	Burg, Fehmarn, 06:15
Activities:	- 07:20 – 10:03 Under video profiling (4 profiles) - 10:15 – 15:15 Transit & de-installation of scientific equipment
Arrival:	Kiel, 15:15
Weather Conditions:	Cloudy, NE 3 Bft ,wave 0 m

4. Equipment

4.1 Side scan sonar (SSS)

To obtain high resolution sonographs of the sea floor the side scan sonar unit of the C3D (Teledyne Benthos) system was used. The device was towed behind the vessel in water depth of approximately 5 - 6 m running with a towing speed of 5 knots. The frequency of the device is 200 kHz. The survey was run with a range of 100 m to each side applied. Data were recorded and mosaiced with the Isis SONAR software "Triton Elics".

4.2 Sub bottom profiler (SBP)

Seismic data were recorded with the sub bottom installed in the the C3D unit (Teledyne Benthos). The data were acquired in a low chirp frequency mode (1.5-10 kHz).

4.3 Multibeam echo sounder (MBES)

Multibeam surveys were performed with shipboard SeaBeam 1185 (L3-Communications, ELAC Nautik GmbH), which operates with a sonar frequency of 180 kHz. The system collects bathymetric and backscatter data simultaneously with a swath width of 153.5°. The profiles were run with a vessel speed of 5 knots. The data was acquired and recorded using the software Hydrostar (L3-Communicatioins, ELAC Nautik GmbH).

4.4 Conductivity-Temperature-Depth probe (CTD)

Conductivity, temperature and depth profiles were measured with a CTD probe of Sea and Sun technology. The calculated sound velocity values are necessary to correctly record water depth values with the multibeam.

4.5 Grab sampler

Sampling for ground truthing was done with a 60 kg HELCOM standard grab sampler. Subsamples were taken for sedimentological lab analysis.

4.6 Underwater video

For optical ground truthing an underwater video camera of type Mariscope Micro was used. The device was dragged from the research vessel a few decimetres above the sea floor. The

video images are transferred via a coax-cable to a monitor in real-time. The images were stored on a hard disk.

5. Performed work and preliminary results

During this cruise the northern part of Sagasbank was mapped by 16 hydroacoustic profiles (SSS, SBP, MBES) comprising an area of approximately 35 km² (Figure 2). Side scan sonar data were calibrated with 16 grab samples and five under water video profiles.

The side scan sonar data show near shore and in most of the Sagasbank area high backscatter, associated with hard bottom substrate like rocks, stones and gravel. These so called residual sediments originate from the last glacial period (Schwarzer et al., 2008). Hard substrate deposits extend up to 20 meter water depth. The north-western tip of Sagasbank is characterised by intermediate to low backscatter representing sandy deposits. Below 20 meter water depth low and very homogenous backscatter are observed representing muddy deposits which are typical for “deep” water regions in the Baltic Sea (Schwarzer & Diesing, 2006).

Sub bottom profiles indicate a backfilled sub bottom channel which runs approximately in north-south direction between the western 10 meter contour line and Sagasbank (Figure 3). The channel cuts up to 7 meter into the sub bottom.

Multibeam data are not processed so far. The surveyed area is due to a track distance of 180 meter not full covered.

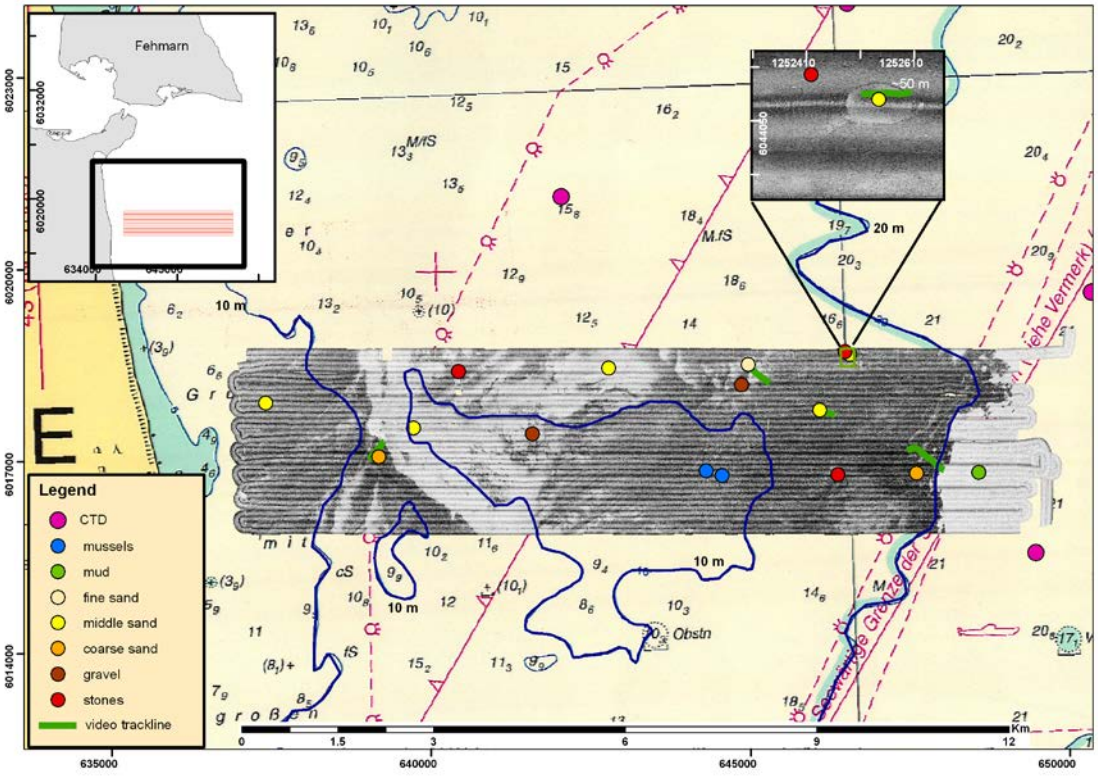

Figure 2: Side scan sonar mosaic with grab sampling stations, CTD stations and under water video profiles. Projection: UTM (WGS82, 32N)

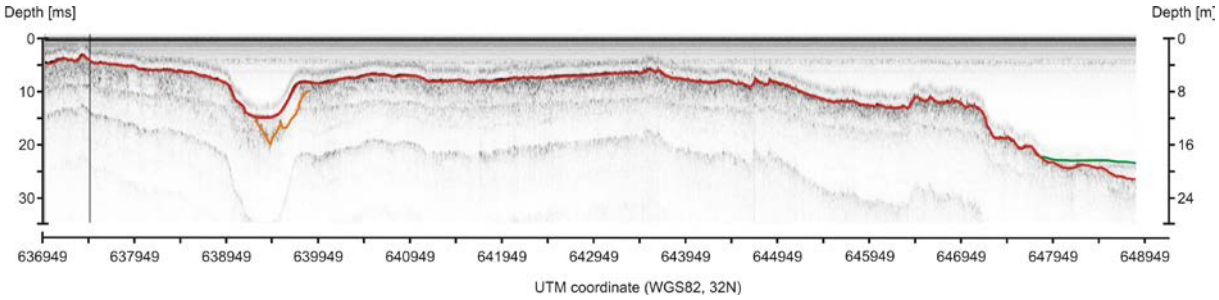

Figure 3: Sub bottom profile showing the back filled channel running in north-south direction between the 10 meter contour line near shore and the Sagasbank.

6. Conclusion

Hydroacoustic measurements were run with good to excellent data quality. Grab sampling and under video profiles well complement hydroacoustic data. Hard substrate, which present habitat for sea grass, algae, macro-zoobenthos and fishes, was found also beyond the Sagasbank up to 20 metre water depth. The hard substrate area is not jet completely mapped. Additional profiles in the north and south are necessary to record the entire hard substrate area.

7. Acknowledgements

We would like to thank master (B. Brockmann) and crew of RV LITTORINA for giving us all kind of support during this cruise.

8. References

Schwarzer, K. and Diesing, M. (2006): Abschlussbericht – Erforschung der FFH-Lebensraumtypen Sandbank und Riff in der AWZ der deutschen Nord- und Ostsee.

Schwarzer, K., Themann, S. and Krause, R. (2008): Abschlussbericht – Zusammenstellung der marinen Lebensraumtypen nach FFH. Institut für Geowissenschaften, Christian-Albrechts-Universität zu Kiel, 29 p.

9. Apendices

Coordinates are in UTM (WGS82, 32N)

9.1 Hydroacoustic profiling

Nr.	Date	Time (UTC)	Longitude	Latitude	Comment
3	27.02.2012		649143	6018664	Profile start
4	27.02.2012		637105	6018664	Profile end
5	27.02.2012	14:28	637105	6018484	Profile start
6	27.02.2012	15:44	649143	6018484	Profile end
7	28.02.2012	08:14	649143	6018304	Profile start
8	28.02.2012	09:29	637105	6018304	Profile end
9	28.02.2012	09:32	637105	6018124	Profile start
10	28.02.2012	10:47	649143	6018124	Profile end
11	28.02.2012	10:50	649143	6017944	Profile start
12	28.02.2012	12:06	637105	6017944	Profile end
13	28.02.2012	12:09	637105	6017764	Profile start
14	28.02.2012	13:25	649143	6017764	Profile end
15	28.02.2012	13:28	649143	6017584	Profile start
16	28.02.2012	14:43	637105	6017584	Profile end
17	28.02.2012	14:46	637105	6017404	Profile start
18	28.02.2012	16:00	649143	6017404	Profile end
19	29.02.2012	08:54	649143	6017224	Profile start
20	29.02.2012	10:09	637105	6017224	Profile end
21	29.02.2012	10:11	637105	6017044	Profile start
22	29.02.2012	11:25	649143	6017044	Profile end
23	29.02.2012	11:40	649143	6016864	Profile start
24	29.02.2012	12:58	637105	6016864	Profile end
25	29.02.2012	13:00	637105	6016684	Profile start
26	29.02.2012	14:14	649143	6016684	Profile end
27	29.02.2012	14:17	649143	6016504	Profile start
28	29.02.2012	15:34	637105	6016504	Profile end
29	01.03.2012	07:46	637105	6016324	Profile start
30	01.03.2012	09:03	649143	6016324	Profile end
31	01.03.2012	09:06	649143	6016144	Profile start
32	01.03.2012	10:24	637105	6016144	Profile end
33	01.03.2012	10:26	637105	6015964	Profile start
34	01.03.2012	11:43	649143	6015964	Profile end

9.2 CTD Profiling

Name	Date	Time (UTC)	Longitude	Latitude	Comments
20120227_001	27.02.2012	12:58	646505	6024166	
20120228_002	28.02.2012	07:23	650328	6019656	
20120229_003	29.02.2012	08:34	649458	6015583	
20120301_004	01.03.2012	07:09	642031	6021145	

9.3 Grab Sampling

Name	Date	Time (UTC)	Longitude	Latitude	Water depth (meter)
20120301_01	01.03.2012	12:00	5984504	1748179	20.99
20120301_02	01.03.2012	12:07	5984967	1745919	18.17
20120301_03	01.03.2012	12:12	5985520	1743073	14.05
20120301_04	01.03.2012	12:15	5986993	1742743	13.24
20120301_05	01.03.2012	12:25	5988468	1740386	14.59
20120301_06	01.03.2012	12:28	5988096	1740041	13.30
20120301_07	01.03.2012	12:36	5986380	1738868	9.55
20120301_08	01.03.2012	12:41	5986595	1738313	9.64
20120301_09	01.03.2012	12:50	5989444	1735305	12.97
20120301_10	01.03.2012	13:00	5988662	1732195	
20120301_11	01.03.2012	13:09	5990496	1729842	12.70
20120301_12	01.03.2012	13:15	5989673	1727923	11.90
20120301_13	01.03.2012	13:20	5989339	1726513	13.60
20120301_14	01.03.2012	13:38	5991288	1722682	9.20
20120301_15	01.03.2012	14:16	5987910	1744114	18.30
20120301_16	01.03.2012	14:24	5988004	1743954	17.00

9.4 Video Profiling

Name	Date	Time (UTC)	Longitude	Latitude	Comments
20120301_01	01.03.2012	14:45	646527	6018690	Profile start
20120301_01	01.03.2012	14:56	646582	6018696	Profile end
20120302_02	02.03.2012	07:20	645006	6018462	Profile start
20120302_02	02.03.2012	07:45	645466	6018172	Profile end
20120302_03	02.03.2012	07:49	646129	6017751	Profile start
20120302_03	02.03.2012	07:59	646288	6017734	Profile end
20120302_04	02.03.2012	08:10	647454	6017181	Profile start
20120302_04	02.03.2012	08:53	648024	6016866	Profile end
20120302_05	02.03.2012	09:28	639066	6017062	Profile start
20120302_05	02.03.2012	10:03	639245	6017302	Profile end